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HARRINGTON & SMITH
4 RESEARCH DRIVE, Suite 202
SHELTON, CT 06484-6212

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| TIMORY, KABIR A | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/820,347 | HALL ET AL. | |
| | Examiner | Art Unit | |
| | KABIR A. TIMORY | 2611 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 18 June 2010.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-31 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-31 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### Response to Arguments

1. This office action is in response to the amendment filed on 06/18/2010. Claims 1-31 are pending in this application and have been considered below.

2. Applicant arguments regarding the rejection under 35 U.S.C. 103(a) as being unpatentable over Ling et al (US 2003/0043928), the rejection under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Slack et al. (Us 4,574,252), and the rejection under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Rogards et al. (Us 4,718,066) have been fully considered but they are not persuasive. The examiner thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meets the claimed limitation as rejected.

**(1) Applicant's argument:** "Applicant has examined every instance in Ling that discussed fading, and none of them teach or imply insertion of zero symbols to replace symbols degraded by a signal degrading event, e.g., fading".

**Examiner's response:** In paragraph 0139, Ling et al. disclose: ***"De-puncturer 159 then inserts "erasures" for code bits that have been deleted (i.e., punctured) at the transmitter. <u>The erasures typically have a value of zero ("0")</u>, which is indicative of the punctured bit being equally likely to be a zero or a one". In this paragraph Ling et al. clearly disclose that the de-puncturer 159 is capable of replacing the code bits (interpreted to be symbols) that have been***

***deleted by the at the transmitter".*** Moreover, in Par 0025, Ling et al. disclose: ***"The interleaving provides time and frequency diversity for the coded bits, permits the data to be transmitted based on an average SNR for the subchannels used for the data transmission, combats fading, and further removes correlation between coded bits used to form each modulation symbol, as described below. The interleaved bits are then punctured (i.e., deleted) to provide the required number of coded bits. The encoding, channel interleaving, and puncturing are described in further detail below. The unpunctured coded bits are then provided to a symbol mapping element 118".*** Therefore, the Ling receiver can insert **"zero symbols into a received symbol stream to replace symbols degraded by the signal degrading event"**.

**(2) Applicant's argument:** "Outstanding Office Action, pages 9-10. Even if the Examiner's argument shown immediately above is true (to which Applicant does not admit), there is still no reason given why one skilled in the art would combine Slack's AGC subsystem with Ling's coding techniques in order to perform the claimed *detecting an occurrence of a symbol degrading event* by using, an AGC circuit. One skilled in the art that combined Ling and Slack still would not create a system that has all the claimed features of claims 9 and 1".

**Examiner's response:** In col 1, lines 57-60, Slack et al. discloses: "Another object of the invention is to provide an AGC device which will produce automatic gain control of input signals, such as incoming RF signals, over a large dynamic range of input levels with a constant rise time". In col 3, lines 25-68 and col 4, lines 1-14, Slack et al. discloses: "In essence the constant rise AGC device 10 is a pair of AGC loops 11 and 22, the loop 22 being

within the larger loop 11 and providing a fast AGC, and the remainder of the larger loop 11 producing a slow AGC. The fast loop 22 is utilized to avoid saturation and the remainder of the slow (larger) loop 11 allows for optimized rise and fall times. More specifically the input signal 12 is split and provided to both the input voltage control amplifier 16 and the output voltage control amplifier 18. The output from the voltage control amplifier 16 is fed to the fast detector 26 which detector has a time constant which is faster than the rise time of IF filter 13 outputting the input signal 12. The output of the fast detector 26 is buffered by the buffer 32 and the resulting fast AGC signal is fed back via the lead 24 to control the gain of the voltage control amplifier 16. The fast detector 26 is fast enough so that the AGC action for the voltage control amplifier 16 is essentially instantaneous. This instantaneous action keeps the voltage control amplifier 16 from saturating with any input level over greater than a range such as 100 dB. The fast AGC peak level outputting at 23 is always directly log linearly related to the input signal 12. The fast AGC voltage at 23 is fed to the slow detector 20 which has the selectable AGC rise time governed at 36. The AGC rise and fall times can be optimized for the particular system and for the radio frequency environment that the device is to work in. **In general the rise time will be somewhat slow, such as 5 milliseconds, to reduce the effects of interference bursts in the input signal 12, and at HF frequencies the slow AGC fall time will be long, such as 500 milliseconds, to maintain AGC between input signals 12, but yet fast enough to follow any signal fading**. The slow AGC voltage from the detector 20 is then fed to the buffer amplifier 38 where there is the AGC gain control 39. The AGC gain control adjusts for differences in gain between the fast and slow AGC circuits 22 and 11, respectively, so that the two AGC voltages therefrom have substantially the same steady state AGC voltages and track each other. Consequently the slow AGC voltage controlling the gain of voltage control amplifier 18 is substantially the same level as the fast AGC voltage controlling the voltage control amplifier 16. Since the voltage control amplifiers 16 and 18 can be integrated circuits which are identical in all respects, their outputs, except for rise and

fall times, are of identical amplitude. Therefore, for any input level of the signal 12 the output of the voltage control amplifier 18 will always rise to the steady state level in the same amount of time. This is a particularly valuable performance characteristic for short burst types of communications systems. The output of the voltage control amplifier 18 is then fed to the linear variable gain IF amplifier 40 and then to a current driver 42 to drive the 50 ohm load. The main advantage of the present invention is that the AGC voltage never saturates, thus permitting precise and constant AGC buildup for any input signal level". Thus, it would have been obvious to one of ordinary skilled in the at the time the invention was made to use the AGC circuit of Slack et al. in order to detect an incoming signal over a large dynamic range of input levels and produce automatic gain control of input signals, such as incoming RF signals, over a large dynamic range of input levels with a constant rise time and to adjust the signal power level of the received signal.

**(3) Applicant's argument:** "Regarding claims 27-31, the Examiner rejected these claims as being unpatentable over Ling in view of "Shor et al." and in further view of Rogards (U.S. Patent no. 4,718,066). Although the Examiner makes no mention that Applicant can find of what reference "Shor et al." is, it is believed this is Shor, U.S. Patent Publication no. 2004/0174809. If that is not the case, Applicant requests a new set of rejections in a non-final Office Action in order to respond to proper rejections".

**Examiner's response:** In item 9 of the last office action "Shor et al." was a typographical error. However, the body of the rejection clearly discloses that claims 27-31 are unpatentable over Ling et al. in view of Rogard. For example on pages 13-15,

the examiner clearly shows that claim 27 is unpatentable over Ling et al. in view of Rogard et al.

**(4) Applicant's argument:** "Thus, Rogards also does not disclose at least the subject matter of "detecting occurrence of a fading condition due to obstruction by the propeller blade" in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the receiver to replace symbols degraded by the fading condition caused by the obstructing propeller blade; de-interleaving the received symbol stream having the inserted zero symbols" in claim 27. Therefore, the combination of Ling and Rogards does not disclose this subject matter".

**Examiner's response:** In col 1, lines 22-34, Rogards et al. discloses: "In the case of a satellite to-earth station link, for which the invention is particularly suitable, the transmission of data is frequently affected by **periods of fading** or even complete interruption of communication (black-out). FIGS. 3 and 4 of the accompanying drawings, which represent the received signal displayed on the cathode screen of a spectrum analyzer, show typical examples of such disturbances: the signal of **FIG. 3 corresponds to periodic fading (periodic fading interpreted to be a fading condition due to obstruction by the propeller blade) such as may be produced by regularly spaced trees along a road along which a receiver vehicle is driving**; FIG. 4 corresponds to temporary fading caused by passing under a bridge which crosses a motorway".

## *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**4. Claims 1, 2, 4, 6-8, 13-15, 17, 19-21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al (US 2003/0043928).**

**Regarding claims 1 and 14:**

As shown in figure 1, Ling et al. discloses a method to operate a digital signal receiver, comprising:

- detecting occurrence of a symbol degrading event for a received signal (error detection is interpreted to be detecting the occurrence of a symbol degrading. Also channel interleaver provides diversity against path effects such as fading) (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4);
- wherein the symbol degrading event occurs after transmission and before reception of the received signal ***(this limitation is well known and inherent in the art. One of ordinary skilled in the art knows that the signal is expected to suffer propagation loss such as "symbol degrading event" as it travels from the transmitter to the receiver. In order to show the inherency for this limitation, the examiner is referring to a book "CDMA RF SYSTEM ENGINEERING" By Samuel C. Yang, Pages14-26, published by***

***Artech House Publishers in 1998.*** ***<u>Please note that this reference is not provided as a prior art for this rejection, but to show the inherency of this limitation</u>.)***;

- inserting zero symbols into a received symbol stream to replace symbols degraded by the signal degrading event prior to de-interleaving the received signal (paragraph 0025, lines 9-18, paragraph 0029, lines 13-19); and
- error correction decoding the received symbol stream having the inserted zero symbols (figure 8, paragraph 0144, lines 1-6).

***Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and "erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164".*** in Par 0025, Ling et al. disclose: ***"The interleaving provides time and frequency diversity for the coded bits, permits the data to be transmitted based on an average SNR for the subchannels used for the data transmission, <u>combats fading</u>, and further removes correlation between coded bits used to form each modulation symbol, as described below. The interleaved bits are then punctured (i.e., deleted) to provide the required number of coded bits. The encoding, channel interleaving, and puncturing are described in further detail below. <u>The unpunctured coded bits are then provided to a symbol mapping element 118</u>".*** And in par 0029, Ling et al. disclose: ***"The received symbols for the transmission channels are then provided to a bit calculation unit 158 that***

***performs processing complementary to that performed by symbol mapping element 118 and provides values indicative of the received bits. Erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164. The channel deinterleaving, de-puncturing, and decoding are complementary to the channel interleaving, puncturing, and encoding performed at the transmitter".***

Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols degraded by the signal degrading event. However, based on the cited portions of the ling et al. reference, it would have been obvious to one of ordinary skilled in the art at the invention was made to use the method of zero insertion as taught by Ling et al. to insert zero to "replace symbols degraded by the signal degrading event" (fading) in order to combat signal fading.

**Regarding claims 2 and 15:**

Ling et al. further discloses where error correction decoding comprises operating a Reed-Solomon decoder (the system which has Reed-Solomon coder would also have a Reed-Solomon decoder) (paragraph 0068, lines 3-6).

**Regarding claims 4 and 17:**

Ling et al. further discloses where error correction decoding comprises operating a Turbo decoder (paragraph 0135, lines 4-5).

**Regarding claims 6 19:**

Ling et al. further discloses where inserting occurs after a Viterbi decoder (paragraph 0147, lines 1-3).

**Regarding claims 7 and 20:**

Ling et al. further discloses where error correction decoding comprises first de-interleaving the received symbol stream having the inserted zero symbols (figure 8, 160, paragraph 0029, lines 13-19).

**Regarding claims 8 and 21:**

Ling et al. further discloses where detecting comprises:

- estimating a signal to noise ratio (SNR) of a block of L contiguous received symbols, where L is an integer greater than or equal to one;
  comparing the estimated SNR to a threshold SNR value (paragraph 0010, lines 6-9); and
- replacing L symbols with L zero symbols when the estimated SNR is less than the threshold SNR (paragraph 0025, lines 9-16).

**Regarding claims 13 and 26:**

Ling et al. further discloses where detecting uses information received from a transmitter that is indicative of a time when a deep fade occurs (figure 1, paragraph 0084, lines 1-4).

**5. Claims 3, 5, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Koetter et al. (Us 6,634,007).**

**Regarding claim 3 and 16:**

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where error correction decoding comprises operating a BCH decoder.

However, Koetter et al., in the same field of endeavor, teaches where error correction decoding comprises operating a BCH decoder (column 12, lines 27-32).

One of ordinary skill in the art would have clearly recognized that in order to correct multiple random errors, coding methodology such as BCH (Bose-Chaudhuri-Hocquenghem) coding is used. By using this technique, we can estimate the likelihoods of the symbols that were input to the communication channel. In order to estimate the likelihood of the received symbols, it would have been obvious to one ordinary skill in the art at the time the invention was made to use BCH coding methodology as taught by Koetter et al. in the soft decoding of Reed-Solomon codes. Using BCH decoding techniques is advantageous because it will provide a sufficient method of soft-decision decoding and forward error-correction.

**Regarding claim 5 and 18:**

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where inserting occurs in conjunction with operating a BPSK bit metric calculator.

However, Koetter et al., in the same field of endeavor, teaches where inserting occurs in conjunction with operating a BPSK bit metric calculator (column 16, lines 66-67).

One of ordinary skill in the art would have clearly recognized that there are several modulation techniques such as Phase Shift Keying (PSK). Also in digital communication we can use BPSK (Binary Phase Shift Keying) modulation to modulate the phase of a reference signal. In BPSK, a finite number of phases are used. Each of these phases is assigned a unique pattern of Binary Bits. Usually, each phase encodes an equal number of bits. Each pattern of bits forms the Symbols that is represented by the particular phase. In order to modulate the received signal in digital format, it would have been obvious to one ordinary skill in the art at the time the invention was made to use BPSK modulation methodology as taught by Koetter et al. in the soft decoding of Reed-Solomon codes. It is advantageous to use BPSK modulation because BPSK is the simplest form of PSK. It uses two phases which are separated by 180 degrees. Also BPSK modulation is the most robust of all the PSKs modulation.

**6. Claims 9-12 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Slack et al. (Us 4,574,252).**

**Regarding claim 9 and 22:**

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where detecting comprises examining the output of at least one Automatic Gain Control (AGC) circuit.

However, Slack et al., in the same field of endeavor, teaches, where detecting comprises examining the output of at least one Automatic Gain Control (AGC) circuit (figure 1, abstract, lines 1-6).

One of ordinary skill in the art would have clearly recognized Receivers for mobile communication systems include Automatic Gain Control (AGC) subsystems, which attempt to minimize the fluctuations in the received signal energy and consequently amplitude. In order to accomplish an approximately constant received signal energy, it would have been obvious to one ordinary skill in the art at the time the invention was made to include a AGC circuit in the system as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystem to achieve the appropriate power level in the received signal.

**Regarding claim 10 and 23:**

Ling et al. further discloses means for replacing symbols with zero symbols when either the first or the second threshold is exceeded (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing the output of a slow AGC to a first threshold, means for comparing the output of a fast AGC to a second threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing the output of a slow AGC to a first threshold, means for comparing the output of a fast AGC to a second threshold (figure 1, 20, 26, 34, 36).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

**Regarding claim 11 and 24:**

Ling et al. further discloses means for replacing symbols with zero symbols when the difference exceeds the threshold (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing a difference between the output of a slow AGC and the output of a fast AGC to a threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing a difference between the output of a slow AGC and the output of a fast AGC to a threshold (figure 1, 20, 26, 34, 36, column 3, lines 58-64).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two

fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

**Regarding claim 12 and 25:**

Ling et al. further discloses means for replacing symbols with zero symbols when the difference exceeds the threshold (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing a difference between the output of a fast AGC and an average of the output of the fast AGC to a threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing a difference between the output of a fast AGC and an average of the output of the fast AGC to a threshold (figure 1, 20, 26, 34, 36, column 3, lines 58-64).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast

and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

**7. Claims 27- 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Rogards et al. (Us 4,718,066).**

**Regarding claim 27:**

Ling et al. further disclose

- in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the receiver (error detection is interpreted to be detecting the occurrence of a symbol degrading. Also channel interleaver provides diversity against path effects such as fading) (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4) to replace symbols degraded by the fading condition (abstract, par 0025 and par 0029);
- de-interleaving (figure 1, 160) the received symbol stream having the inserted zero symbols signal (paragraph 0029, lines 13-19); and
- decoding (figure 1, 162) the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

***Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading.***

***Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and "erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164".*** In par 0025, Ling et al. disclose: ***"The interleaving provides time and frequency diversity for the coded bits, permits the data to be transmitted based on an average SNR for the subchannels used for the data transmission, combats fading, and further removes correlation between coded bits used to form each modulation symbol, as described below. The interleaved bits are then punctured (i.e., deleted) to provide the required number of coded bits. The encoding, channel interleaving, and puncturing are described in further detail below. The unpunctured coded bits are then provided to a symbol mapping element 118".*** And in par 0029, Ling et al. disclose: ***"The received symbols for the transmission channels are then provided to a bit calculation unit 158 that performs processing complementary to that performed by symbol mapping element 118 and provides values indicative of the received bits. Erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164. The channel deinterleaving, de-puncturing, and decoding are complementary to the channel interleaving, puncturing, and encoding performed at the transmitter".***

Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols degraded by the signal degrading event. However, based on the cited portions of the ling et al. reference, it would have been

obvious to one of ordinary skilled in the art at the invention was made to use the method of zero insertion as taught by Ling et al. to insert zero to "replace symbols degraded by the signal degrading event" (fading) in order to combat signal fading.

Ling et al. disclose all of the subject matter as described above except for specifically teaching, detecting the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade.

However, Rogards et al., in the same field of endeavor, teaches, detecting the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade (periodic fading is interpreted to be a fading condition due to obstruction by the propeller blade) (figure 3, column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from

that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

**Regarding claim 28:**

Ling et al. further disclose, where decoding comprises operating a concatenated forward error correction (FEC) decoder (figure 1, 162, paragraph 0067, lines 3-5).

**Regarding claim 29:**

Ling et al. further disclose, where decoding comprises operating one of a Reed-Solomon decoder, a BCH decoder, or a Turbo decoder (paragraph 0135, lines 4-5).

**Regarding claim 30:**

Ling et al. further disclose

- in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the satellite (paragraph 0029, lines 13-19) to replace symbols degraded by the fading condition (abstract, par 0025 and par 009);
- de-interleaving (figure 1, 160) the received symbol stream having the inserted zero symbols (paragraph 0029, lines 13-19); and
- error correction decoding (figure 1, 162) the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

***Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and "erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-***

***punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164"***. In par 0025, Ling et al. disclose: ***"The interleaving provides time and frequency diversity for the coded bits, permits the data to be transmitted based on an average SNR for the subchannels used for the data transmission, <u>combats fading</u>, and further removes correlation between coded bits used to form each modulation symbol, as described below. The interleaved bits are then punctured (i.e., deleted) to provide the required number of coded bits. The encoding, channel interleaving, and puncturing are described in further detail below. <u>The unpunctured coded bits are then provided to a symbol mapping element 118</u>"***. And in par 0029, Ling et al. disclose: ***"The received symbols for the transmission channels are then provided to a bit calculation unit 158 that performs processing complementary to that performed by symbol mapping element 118 and provides values indicative of the received bits. <u>Erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110</u>. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164. The channel deinterleaving, de-puncturing, and decoding are complementary to the channel interleaving, puncturing, and encoding performed at the transmitter"***.

Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols degraded by the signal degrading event. However, based on the cited portions of the ling et al. reference, it would have been obvious to one of ordinary skilled in the art at the invention was made to use the method of zero insertion as taught by Ling et al. to insert zero to "replace symbols degraded by the signal degrading event" (fading) in order to combat signal fading.

Ling et al. disclose all of the subject matter as described above except for specifically teaching, detecting, on the satellite, the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade.

However, Rogards et al., in the same field of endeavor, teaches, detecting, on the satellite, the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade (periodic fading is interpreted to be a fading condition due to obstruction by the propeller blade) (figure 3, column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

**Regarding claim 31:**

Ling et al. further disclose:

- inserting zero symbols into a received symbol stream (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4) to replace symbols corrupted by the fading condition (par 0025 and par 0029); and
- an error correction decoder (figure 1, 162) for decoding the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and "erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164".

***Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and "erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data***

***sink 164"***. In par 0025, Ling et al. disclose: ***"The interleaving provides time and frequency diversity for the coded bits, permits the data to be transmitted based on an average SNR for the subchannels used for the data transmission, combats fading, and further removes correlation between coded bits used to form each modulation symbol, as described below. The interleaved bits are then punctured (i.e., deleted) to provide the required number of coded bits. The encoding, channel interleaving, and puncturing are described in further detail below. The unpunctured coded bits are then provided to a symbol mapping element 118"***. And in par 0029, Ling et al. disclose: ***"The received symbols for the transmission channels are then provided to a bit calculation unit 158 that performs processing complementary to that performed by symbol mapping element 118 and provides values indicative of the received bits. Erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164. The channel deinterleaving, de-puncturing, and decoding are complementary to the channel interleaving, puncturing, and encoding performed at the transmitter"***.

Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols degraded by the signal degrading event. However, based on the cited portions of the ling et al. reference, it would have been obvious to one of ordinary skilled in the art at the invention was made to use the method of zero insertion as taught by Ling et al. to insert zero to "replace symbols degraded by the signal degrading event" (fading) in order to combat signal fading.

Ling et al. disclose all of the subject matter as described above except for specifically teaching, a satellite, comprising a receiver for receiving a signal that passes through a channel that is periodically obstructed, the receiver comprising circuitry for detecting the occurrence of a fading condition due to an obstruction and, in response to detecting the occurrence of the fading condition and caused by the periodic obstruction.

However, Rogards et al., in the same field of endeavor, teaches a satellite, comprising a receiver for receiving a signal that passes through a channel that is periodically obstructed, the receiver comprising circuitry for detecting the occurrence of a fading condition due to an obstruction and, in response to detecting the occurrence of the fading condition and caused by the periodic obstruction (column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from

that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KABIR A. TIMORY whose telephone number is (571)270-1674. The examiner can normally be reached on 8:00 AM - 4:30 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kabir A Timory/
Examiner, Art Unit 2611
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611